# Comparison of Permafrost-Affected Soil of North Canada, Alaska, and the Lower Kolymar Region of Far Eastern Russia

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## Introduction

In this poster, the physical, chemical, and mineralogical properties and vegetation of the soils on the North Slope of Alaska and Canada are compared to soils at similar latitudes in the Lower Kolymar Region of the Russian Far East. The soils in Canada and Alaska are highly cryoturbated Gelisols while the ones in Russia are much less cryoturbated. In the forested areas with permafrost in Canada, black spruce is the predominate species; while in Far Eastern Russia, it is larch. The tundra vegetation in Canada and Alaska is more forbes while in Far Eastern Russia it is more grasses. There are many more cryogenic features in Canada and Alaska (frost boils, sorted nets, and active cryoturbation). Similar features are observed in Russia but to a lesser extent in the Kuniska Tundra. The Kuniska Tundra is a unique grassy tundra over a landscape of yedoma sediments.

The question is: What soil forming factors control the different soil development? It is thought that the climate may be a major influence, but other properties are compared to see if there are differences in the soils of the Kuniska Tundra and the soils of the North Slope of Alaska. The soils on the Kuniska Tundra have well-developed surface A horizons, which are grassy soils mostly lacking in mosses.

All of the soils used in this comparison are in the area of continuous permafrost. The coastal areas are arctic tundra without trees while the inland sites are in areas of mixed tundra and trees.

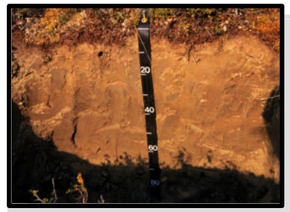

**Figure 4**. A representative profile of the soils in a forested area near Cherskiy, Russia. There is little evidence of cryoturbation.

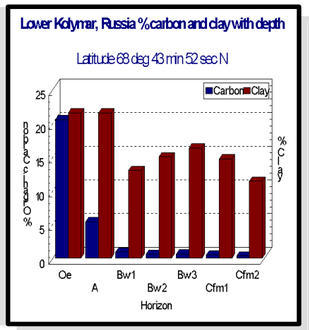


**Figure 5**. The clay and organic carbon distribution by horizon with depth for the profile shown in Figure 4.

**Figure 6**. The typical landscape in the area represented by Figure 4.

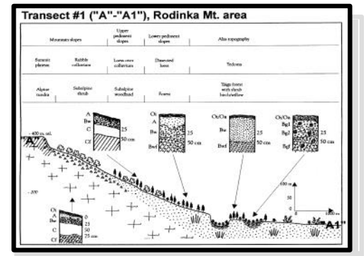


**Figure 7**. A representative transect for the soils and landscapes near Cherskiy, Russia.

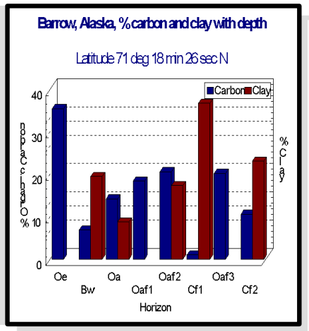


**Figure 8**. The clay and organic carbon distribution by horizon with depth for a typical profile near Barrow, Alaska, on the Beaufort Sea.

**Figure 9**. The typical landscape in the Barrow area (representative of the North Slope of Alaska).

**Figures 10 and 11**. Typical profiles that could be found on the North Slope of Alaska or in Canada in the area of continuous permafrost.

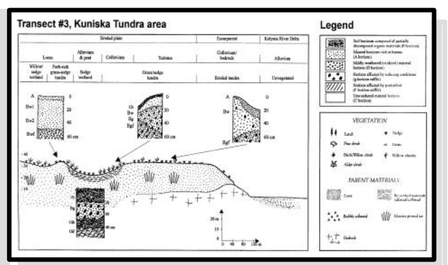


**Figure 1**. A typical landscape transect on the coastal area of Far Eastern Russia near the Kolymar River delta on the East Siberian Sea. There is some cryoturbation, but most horizons, particularly in the loess areas, are parallel to the surface. Even in the grass/sedge areas, there is not extensive mixing.

**Figure 2**. Some of the soil scientists involved in the studies at a typical site in the area, which Figure 1 represents.

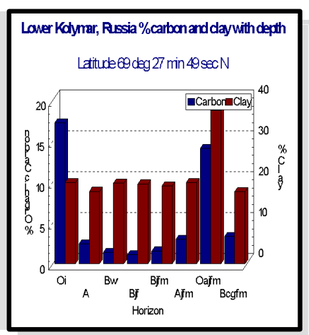


**Figure 3**. The clay and organic carbon distribution by horizon with depth in a representative profile for the area shown in Figure 1.

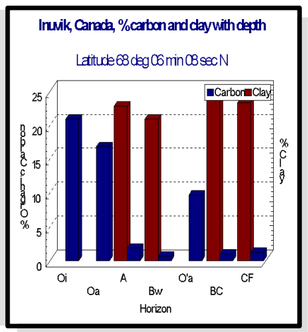


**Figure 12**. The clay and organic carbon distribution by horizon with depth for a typical profile north of Inuvik at Parsons Lake in the tundra region.

**Figure 13**. A landscape area near Inuvik with extensive cryoturbation.

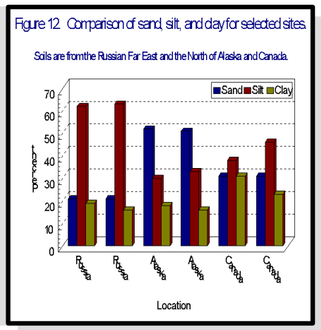


**Figure 14**. The average clay, silt, and sand for six soils representing the northern areas in Far Eastern Russia, Canada, and Alaska.

## Summary

In the Russian Far East, the more representative soils are not highly cryoturbated. That is not to say that there are not large areas of cryoturbated soils, but they do not dominate the landscapes in the north coastal areas as they do on the North Slope of Alaska and the contiguous area of Canada. Figure 14 shows the average clay, silt, and sand for six soils representing the northern areas in Far Eastern Russia, Canada, and Alaska. The major difference is in the percent silt, with the Russian soils having a much higher content. This may be a reason for the difference in cryoturbation. As the vegetation is also quite different, there may be other climatic factors effecting the degree of cryoturbation. Further study is needed to help us understand cryogenic soil forming factors and how they relate to the permafrost soils map, which is shown in another poster.

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